

What is Claimed Is:

1. A maskless lithography system, comprising:
  - a spatial light modulator that includes a plurality of spatial light modulator cells;
  - a reference reticle having at least one reference feature, the reference reticle located in a plane with the spatial light modulator proximate to one of the plurality of spatial light modulator cells;
  - a pattern rasterizer that applies a signal to the spatial light modulator to form a die pattern that includes the at least one reference feature;
  - an illumination source that emits illumination energy to illuminate the spatial light modulator and the reference reticle; and
  - projection optics, having a pupil, that form a die image with illumination energy entering the pupil from the spatial light modulator and a reference image with illumination energy entering the pupil from the reference reticle.
2. The system of claim 1, further comprising:
  - a image scanner that detects the die image and the reference image formed by the projection optics.
3. The system of claim 2, wherein the die image and the reference image are resist images.

4. The system of claim 2, wherein the die image and the reference image are aerial images.
5. The system of claim 2, further comprising:  
  
a comparator coupled to the image scanner that compares the die image to the reference image.
6. The system of claim 5, further comprising:  
  
an adjustment control coupled to the comparator that is adjusted based on an output of the comparator.
7. The system of claim 6, wherein the adjustment control is adjusted at least once during the processing of each lot of substrates.
8. The system of claim 1, further comprising:  
  
a shutter optically located between the illumination source and the reference reticle that controls the amount of illumination energy incident upon the reference reticle from the illumination source.
9. The system of claim 1, further comprising:  
  
a reference reticle positioner that positions the reference reticle to direct incident illumination energy from the illumination source away from the pupil of the projection optics.

10. The system of claim 9, further comprising:  
  
an illumination monitor that measures the intensity of the illumination energy directed away from the pupil of the projection optics by the reference reticle.
11. The system of claim 10, further comprising:  
  
an illumination controller coupled to the illumination monitor that adjusts the amount of illumination energy emitted by the illumination source based on an output of the illumination monitor.
12. The system of claim 9, further comprising:  
  
an illumination monitor that measures the intensity of the illumination energy transmitted through the reference reticle.
13. The system of claim 12, further comprising:  
  
an illumination controller coupled to the illumination monitor that adjusts the amount of illumination energy emitted by the illumination source based on an output of the illumination monitor.
14. A method for adjusting a maskless lithography system that includes an illumination source, a spatial light modulator, a reference reticle having at least one reference feature, and projection optics having a pupil, comprising:
  - (a) illuminating the reference reticle with illumination energy emitted by the illumination source;

- (b) forming a reference image of the at least one reference feature of the reference reticle with illumination energy from the reference reticle that enters the pupil of the projection optics;
- (c) applying a signal to the spatial light modulator to form a die pattern that includes the at least one reference feature;
- (d) illuminating the spatial light modulator with illumination energy emitted by the illumination source while the signal is applied to the spatial light modulator;
- (e) forming a die image of at least one reference feature with illumination energy from the spatial light modulator that enters the pupil of the projection optics;
- (f) comparing the die image of the at least one reference feature to the reference image of the at least one reference feature; and
- (g) adjusting the maskless lithography system based on the comparison in step (f).

15. The method of claim 14, further comprising:

- (h) shuttering the reference reticle to prevent illumination of the reference reticle by illumination energy emitted from the illumination source.

16. The method of claim 14, further comprising:

- (h) positioning the reference reticle to reflect incident illumination energy from the illumination source away from the pupil of the projection optics.

17. The method of claim 16, further comprising:
  - (i) measuring the intensity of the illumination energy reflected from the reference reticle.
18. The method of claim 17, further comprising:
  - (j) adjusting the intensity of the illumination energy emitted by the illumination source based on the intensity of the illumination energy measured in step (i).
19. The method of claim 17, further comprising:
  - (j) recording the intensity of the illumination energy measured in step (i).
20. The method of claim 16, further comprising:
  - (i) measuring the intensity of the illumination energy transmitted through the reference reticle.
21. The method of claim 20, further comprising:
  - (j) adjusting the intensity of the illumination energy emitted by the illumination source based on the intensity of the illumination energy measured in step (i).

22. The method of claim 21, further comprising:
- (j) recording the intensity of the illumination energy measured in step (i).
23. The method of claim 14, wherein step (f) comprises:
- comparing resist images.
24. The method of claim 14, wherein step (f) comprises:
- comparing aerial images.
25. The method of claim 14, wherein the reference reticle and the spatial light modulator are mounted on a movable surface, and the method further comprises:
- (h) tilting the movable surface;
  - (i) observing the reference image of the at least one reference feature to determine the effects of the tilting in step (h), the reference image being an aerial image; and
  - (j) positioning the movable surface based on the observations of step (i) to achieve a desired telecentricity.